135560

Superfund Program

U.S. Environmental Protection Agency - Region III

Proposed Plan

Whitmoyer Laboratories
Lebanon County, Pennsylvania

April 1990

INTRODUCTION

The U.S. Environmental Protection Agency Region III (EPA) recently completed a *Remedial Investigation/ Feasibility Study (RI/FS)* for the Whitmoyer Laboratories Site. The site is located on approximately 22 acres in Jackson Township, Lebanon County, Pennsylvania, approximately 1 mile southwest of the borough of Myerstown. The RI indicated that concentrated wastes abandoned in a concrete vault; concentrated wastes abandoned in two groups of *lagoons*; outdated products and miscellaneous chemicals abandoned in the buildings; and the buildings and related structures (tanks, process, equipment, etc.) located on the Whitmoyer Laboratories Site may present a significant actual or potential threat to human health and the environment. (For this Proposed Plan, the terms "vault wastes," "*lagoon* wastes," "miscellaneous products/ feedstocks," and "site structures" will be used to refer to these materials, respectively.) The FS identified and evaluated remedial alternatives for these materials. After the FS was completed, two former site owners, Rohm & Haas and SmithKline Beecham, proposed a separate remedial alternative for the vault wastes, *lagoon* wastes, and miscellaneous products/feedstocks to the EPA. This Proposed Plan presents the FS remedial alternatives and former owner remedial alternative, and identifies EPA's preferred option for cleaning up the materials.

This Proposed Plan for the Whitmoyer Laboratories Site has been prepared by the EPA to facilitate public participation in the decision-making process regarding remediation of the vault and *lagoon* wastes, miscellaneous products/feedstocks, and site structures. The Proposed Plan (1) fulfills the public notification requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (*CERCLA*) Section 117(a); (2) describes the remedial options evaluated in the Feasibility Study; (3) describes the remedial option proposed by the former site owners; (4) identifies EPA's preferred alternative and explains why the EPA prefers it; (5) solicits community involvement in the selection of a remedy; and (6) refers interested parties to the Remedial Investigation and Feasibility Study reports, the former owners' proposed remedial program, and other site-related documents housed in the local information repository at the Myerstown Public Library; Myerstown, Pennsylvania. Words *italicized* in this Proposed Plan are defined in the glossary insert.

EPA and the Pennsylvania Department of Environmental Resources (PADER) encourage the public to review site-related materials to better understand the Superfund actions that will be occurring at the Whitmoyer Laboratories Site. PUBLIC COMMENTS CONCERNING THE REMEDIAL ACTIONS DESCRIBED IN THIS PROPOSED PLAN WILL BE ACCEPTED BY THE EPA REPRESENTATIVES LISTED AT THE END OF THIS DOCUMENT DURING THE PUBLIC COMMENT PERIOD WHICH BEGINS ON APRIL 13, 1990, AND CLOSES ON MAY 14, 1990. ON APRIL 24, 1990, A PUBLIC MEETING TO DISCUSS THE REMEDIAL ALTERNATIVES WILL BE HELD AT THE JACKSON TOWNSHIP BUILDING IN JACKSON TOWNSHIP, PENNSYLVANIA AT 7:30 P.M.

During this public comment period, the public is encouraged to submit comments on the Proposed Plan and RI/FS to EPA. EPA, in consultation with the Commonwealth of Pennsylvania, may modify the preferred alternative, select another response action presented in this Plan, or develop another alternative, if public comment warrants such action, or if new material is presented.

SITE BACKGROUND

In 1934, Whitmoyer Laboratories, Incorporated (WLI) was formed and reportedly began producing veterinary pharmaceuticals at the site. Very little information is available about WLI operations prior to 1957, when the company began manufacturing organic arsenicals. As a result of this process, large quantities of *arsenic* wastes were produced and disposed in various onsite locations. These wastes included sodium-*arsenic*, iron-*arsenic*, and possibly organically-bound *arsenic* compounds.

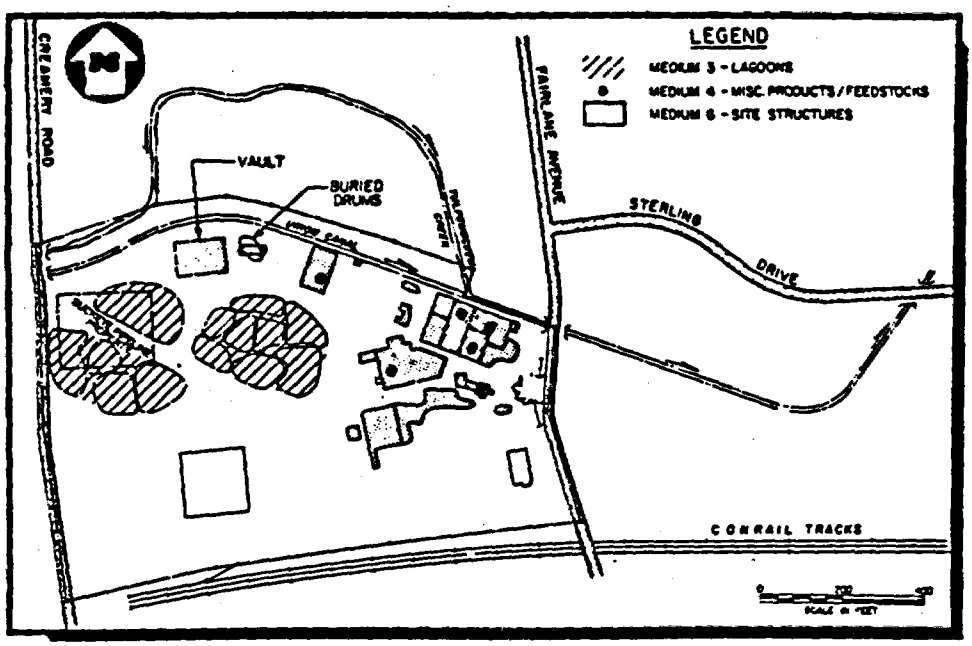
Over the years, WLI changed hands several times. Shortly after purchasing the facility in 1964, the Rohm & Haas Company discovered that *arsenic* had

contaminated the local *groundwater* and took steps to remediate the site. In 1978, Beecham Laboratories (now Smith Kline Beecham) acquired WLI and, subsequently, sold it to Stafford Laboratories, Incorporated, in 1982. Despite previous efforts by owners to address site-related contamination, an EPA investigation of the site, conducted in early 1984, revealed *arsenic* and organic chemical contamination in *groundwater*, both on and off the site. Shortly after Stafford Laboratories filed for bankruptcy in 1984, EPA proposed that the site be added to the *National Priorities List (NPL)*, a list of hazardous waste sites across the country in need of remediation. The site was finalized on the NPL in June 1986.

The WLI plant reportedly last operated in January 1987. At that time the site was abandoned. Between 1988 and 1990, EPA conducted an *RI/FS* to identify the types, quantities, and locations of contaminants and to develop ways of addressing the contamination problems. The results of the RI are as follows:

- Approximately 800 full drums containing hazardous wastes were discovered to have been abandoned on site.
- Two laboratories and one storage area contained abandoned laboratory wastes and chemicals and samples from former production runs.
- Approximately 69,000 gallons of concentrated liquids, including flammable, corrosive, and acutely toxic wastes, are present in tanks and process vessels on site.
- Approximately 4500 *cubic yards (C.Y.)* of concentrated wastes containing *arsenic, aniline,* and other organic chemicals are present in a concrete vault. The structural integrity of the vault is questionable.
- Approximately 20 drums filled with tar-like material that contains toxic organic chemicals are buried just east of the concrete vault.
- Approximately 26,000 *C.Y.* of iron-*arsenic* sludges and admixed soils are present in two groups of *lagoons*.
- Approximately 100 *C.Y.* of miscellaneous outdated products and unused chemicals (feedstocks) are abandoned inside the buildings.
- Site structures, including production buildings, process equipment and piping, above-ground and underground tanks, and concrete dikes, are contaminated with *arsenic* and organic chemicals.
- Onsite and offsite surface and subsurface soils are contaminated with varying levels of *arsenic* and organic chemicals.
- Several nearby residential water supply wells are contaminated.
- A plume of contaminated *groundwater* extends from the site to east of Race Street.

Exhibit A
Whitmoyer Laboratories Site Map



On March 13, 1990, two former site owners, Rohm & Haas and SmithKline Beecham, proposed a remedial program for the site to EPA.

SCOPE AND ROLE OF ACTION

The problems at the Whitmoyer Laboratories Site are complex. As a result, EPA is addressing portions of the site contamination using its emergency response authorities, whereas other portions are being addressed as a part of the remedial program.

Emergency Response Actions

The approximately 800 drums that were abandoned at the site are being removed as an emergency response action. This action was initiated in October 1988 and is expected to be complete by June 1990. Laboratory wastes and chemicals and production run samples abandoned at the site were disposed as an emergency response action. A public water supply line extension to residences with contaminated wells is currently being designed and will be constructed as an emergency response action. While the line is being designed, affected residences are being supplied by EPA with bottled water.

Other Remedial Actions

EPA has divided the remaining remedial work at the site into three manageable components called "operable units (OUs)." These are as follows:

OU One: Liquids abandoned in tanks and process vessels

OU Two: Vault wastes, *lagoon* wastes, miscellaneous products/feedstocks, and site structures

OU Three: Contaminated soils and *groundwater*

For OU One (the abandoned tank and process vessel liquids), EPA has already selected the cleanup remedy. The Record of Decision (ROD) for OU One was signed on June 30, 1989. This action is in the Remedial Action stage, which means that actual remediation will commence in May 1990. This remediation is expected to be completed in September 1990.

For OUs Two and Three, cleanup remedies have not yet been selected by EPA. This Proposed Plan has been prepared to facilitate public participation in the remedy selection for OU Two. The materials to be addressed in OU Two present some of the principal threats posed by the site. OU Three will be addressed in a future Proposed Plan, which is scheduled to be released in July 1990.

SUMMARY OF SITE RISKS

Waste sampling conducted by EPA at the site revealed that the vault wastes are highly contaminated with *arsenic* (13 percent), *aniline* (6 percent), and n-nitrosodiphenylamine (3 percent); whereas the lagoon wastes are highly contaminated with *arsenic* (2.5 percent). While portions of the miscellaneous products/feedstocks are not considered hazardous, some of these materials are contaminated with *arsenic*. Contaminated surface buildups were identified in most of the buildings on site. (Building 10, the former office, and Building 18, the Major Foods warehouse, were not found to be contaminated.) Additionally, in the Building 1-7 complex, portions of the process equipment, flooring, and roof material are contaminated with *arsenic*.

An analysis was conducted to estimate the health or environmental problems that could result if the vault and *lagoon* wastes, miscellaneous products/feedstocks, and site structures are not cleaned up. The analysis focused on the major contaminants of concern, including *arsenic*, *aniline*, and n-nitrosodiphenylamine. *Arsenic* is known to cause cancer in humans, whereas *aniline* and n-nitrosodiphenylamine are known to cause cancer in laboratory animals. Thus, these chemicals are classified as *carcinogens*. This analysis found that each of these wastes could result in significant risk to human health and the environment. These risks include direct contact with the waste, continuing groundwater contamination, and potential significant contamination of the Tulpehocken Creek. The direct contact risks involve unprotected onsite workers and trespassers. *Arsenic* can be inhaled as a dust or accidently ingested by hand-to-mouth contact. Ingestion of as little as 0.0001 ounces of the vault waste can cause serious illness. Also, *aniline* can be adsorbed directly through the skin. Over the long term, repeated exposure to these wastes could result in an excess cancer risk approaching 1, which is significantly higher than is deemed acceptable. Under *CERCLA*, a cancer risk rate higher than 1 in 10,000 to 1 in 1,000,000 is considered unacceptable. Although these materials are currently covered by soil or a roof, access to them is possible, and with time, these coverings would continue to deteriorate, leading to greater potential for exposure.

As identified in the RI/FS, the groundwater at the site and downgradient of the site is highly contaminated. Peak concentrations of arsenic and other organics measured in the groundwater exceed Federal drinking water standards by a factor of about 3,000. These wastes are currently contaminating and/or would continue to contaminate this groundwater, thereby negating any benefits from remediating this groundwater. Precipitation currently contacts these wastes. With time, as the building and other coverings continue to deteriorate, precipitation and erosion

would convey these contaminants into the groundwater and the creek.

SUMMARY OF ALTERNATIVES

The Superfund process requires that the alternative chosen to clean up a hazardous waste site meet several criteria. The alternative must protect human health and the environment, be cost-effective, and meet the requirements of environmental regulations. Permanent solutions to contamination problems should be developed wherever possible. These solutions should reduce the volume, toxicity, or mobility of the contaminants. Emphasis is also placed on treating the wastes at the site, whenever this is possible, and on applying innovative technologies to clean up the contaminants.

The FS studied a variety of technologies to see if they were applicable for use on the vault wastes, *lagoon* wastes, miscellaneous products/feedstocks, and site structures. The technologies determined to be most applicable to these materials were developed into remedial alternatives. Although site wide alternatives were developed for OU Two, these are not presented herein. The reason for this is that the different nature of each waste lends itself better to individual analysis. A single site wide alternative will be developed in the ROD and which incorporates the selected alternative for each medium. These individual alternatives are presented and discussed below. The remedial alternatives developed by the former site owners and presented to EPA are also described and discussed.

The preferred alternative for each medium in OU Two is discussed in the Evaluation of Alternatives for each Medium and is briefly described as follows.

Vault Waste - Alternative 3 - Onsite fixation of the lower vault contents, and Alternative 4 - Onsite incineration and fixation of the upper vault wastes. The treated wastes would be disposed offsite.

Lagoon Waste - Alternative 3 - Iron-based fixation of the lagoon wastes followed by offsite disposal.

Miscellaneous Products/Feedstocks - Alternative 4 - Onsite incineration and fixation of the hazardous wastes, followed by offsite landfill of the treated residues and other nonhazardous wastes.

Site Structures - Alternative 3 - Surface cleaning of surface contaminated structures, demolition of Building 1-7 complex, tanks, vessels, piping, and equipment; followed by offsite disposal or salvage. Hazardous materials would be treated by incineration and fixation or coating and sealing, followed by offsite disposal.

SUMMARY OF ALTERNATIVES - VAULT WASTES

The alternatives that follow are designed to addre both the concrete vault contents and the contents o the approximately 20 buried drums located east of the concrete vault.

Alternatives 1 through 5 for the vault wastes are numbered to correspond with the numbers in the FS report. Alternative 6 is the alternative presented by the former site owners. The alternatives are the following:

- Alternative 1: No Action
- Alternative 2: Bulk Excavation/Landfill (Onsite)
- Alternative 3: Bulk Excavation/*Fixation*/Landfill (Onsite or Offsite)
- Alternative 4: Bulk Excavation/*Incineration/ Fixation*/Landfill (Onsite or Offsite)
- Alternative 5: Bulk Excavation/*Vitrification*/ Landfill (Onsite or Offsite)
- Alternative 6: On-site Enhanced Solids Containment System

COMMON ELEMENTS. All of the alternatives being considered for the vault wastes would include common components. Alternative 2 and the onsite landfill options of Alternatives 3 through 5 would include long-term *groundwater* monitoring in compliance wi *RCRA*. These monitoring activities would be conducte to assess the effectiveness of the remedy. Alternatives 2 through 6 include bulk excavation of the vault wastes and ultimate disposal of the wastes in a landfill. This landfill would be located on site for Alternatives 2 and 6, and either onsite or offsite for Alternatives 3 through 5. In either case, the landfill would be in compliance with the requirements of *RCRA*. The excavated area would then be backfilled with clean soil and regraded. The vault wastes would be *RCRA*-listed wastes, if excavated and treated.

Alternative 1: NO ACTION

- Capital Cost: 0*
- Annual Operation and Maintenance (O&M) Costs: $7,100*
- Present Worth: $109,000*
- Months to Implement: None*

The Superfund Program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison with the other alternatives. Under this alternative, EPA would take no actions other than annual *groundwater* monitoring around the vau and performing reviews every 5 years.

* All costs and implementation times in this Proposed Plan are estimated.

Alternative 2: BULK EXCAVATION/LANDFILL (ONSITE)

- Capital Cost: $1,027,000*
- Annual O&M Costs: $22,900*
- Present Worth: $1,379,000*
- Months to Implement: 24*

The 4,500 C.Y. of vault wastes would be excavated and placed in a new landfill (LF) located on site. The landfill would be designed to meet or exceed all *RCRA* standards. The Whitmoyer Laboratories Site is underlain by limestone (carbonate) bedrock. Studies by the Pennsylvania Bureau of Topographic and Geologic Survey have shown that the limestone beneath the site can be dissolved by infiltrating rainwater and *groundwater* passing through it. Over time, this dissolution could destabilize the overlying rock and soil, and cause them to cave in (sinkhole collapse). To provide protection against landfill failure, the landfill liner base would be designed to minimize threats posed by sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. Since the wastes would remain on site, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 3: BULK EXCAVATION/FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $10,700,000 (Onsite LF), $15,900,000 (Offsite LF)*
- Annual O&M Costs: $35,200 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $11,300,000 (Onsite LF), $15,900,000 (Offsite LF)*
- Months to Implement: 36*

Following excavation, the 3000 C.Y. of wastes present in the upper 8 feet of the vault ("upper vault wastes") would be *microencapsulated* in a solid matrix, e.g., asphalt, whereas the 1500 C.Y. of wastes present in the lower 4 feet of the vault ("lower vault wastes") would be fixated using cement. This treatment would occur on site. The *microencapsulation* and *fixation* units would comply with technical standards for hazardous waste miscellaneous treatment units. Specialized air pollution control equipment would be applied during the *microencapsulation* step to capture contaminants in the exhaust air and thus ensure compliance with Clean Air Act standards. The *arsenic* mobility in the lower vault wastes would be reduced by approximately 99.94 percent. The degree of reduction in *arsenic* mobility for the *microencapsulated* upper vault wastes cannot be predicted without a treatability study. Alternative 3 should comply with the proposed *land disposal restriction (LDR)* standards for the vault wastes.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill, designed to *RCRA* standards. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 4: BULK EXCAVATION/INCINERATION/ FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $15,250,000 (Onsite LF), $20,500,000 (Offsite LF)*
- Annual O&M Costs: $24,900 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $15,630,000 (Onsite LF), $20,500,000 (Offsite LF)*
- Months to Implement: 3*

Following excavation, the vault wastes would be incinerated to destroy the *organic chemicals* present and to change the *arsenic* to a form more amenable to *fixation*. Specialized air pollution control equipment would be applied to capture contaminants in the exhaust air and thus ensure compliance with Clean Air Act standards. The incinerator residue (ash) would be fixated using cement. Both the *incineration* and *fixation* would occur on site using mobile equipment. The *incineration* and *fixation* units would comply with technical standards for incinerators and miscellaneous treatment units, respectively. Essentially all of the organics would be destroyed. The *arsenic* mobility of the wastes would be reduced by approximately 99.98 percent. Alternative 4 should comply with the proposed LDR standards for the vault wastes.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill designed to *RCRA* standards. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. Furthermore, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 5: BULK EXCAVATION/VITRIFICATION/ LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $34,270,000 (Onsite LF), $58,000,000 (Offsite LF)*
- Annual O&M Costs: $35,200 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $34,800,000 (Onsite LF), $58,000,000 (Offsite LF)*
- Months to Implement: 3*

The 4,500 C.Y. of vault wastes would be excavated and mixed on site with 45,000 C.Y. of soil, [illegible] materials

* All costs and implementation times in this Proposed Plan are estimated.

with a low organic carbon content. (Other site wastes could be used if suitable.) This mixing would occur to achieve a mixture organic carbon content of approximately 5 percent, the maximum content that existing *vitrification* equipment can handle. The mixture would be placed in an onsite trench and heated with electricity flowing through graphite electrodes until the mixture formed a pool of molten glass. Organic contaminants would be destroyed during heating, whereas metal contaminants would become trapped in the glass during the subsequent cooling step. Specialized air pollution control equipment would be applied to ensure compliance with Clean Air Act standards. The *vitrification* unit would comply with technical standards for miscellaneous treatment units. Essentially all of the organics would be destroyed. The *arsenic* mobility of the wastes would be reduced by approximately 99.99 percent. Alternative 5 should comply with the proposed LDR standards for the vault wastes.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill designed to *RCRA* standards. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 6: ON-SITE ENHANCED SOLIDS CONTAINMENT SYSTEM

- Capital Cost, Annual O&M Costs, and Present Worth: Cost estimates were not provided in the former owners' proposal. Costs are likely to be slightly higher than the estimated costs for Alternative 2.*
- Months to Implement: 18*

The vault wastes would be excavated and placed in a new landfill constructed on site. The landfill would be designed to meet or exceed all *RCRA* standards. To provide protection against sinkhole collapse and subsequent landfill failure, a foundation preparation program would be implemented prior to landfill construction. The program would consist of (1) geophysical surveying of the landfill area; (2) drilling exploration borings on a selected grid pattern and at any geophysical anomalies; (3) pressure grouting any openings (voids) discovered in the exploration borings; (4) removing any soil above bedrock and any easily removable rock; and (5) placing aggregate in bedrock joint openings and above the bedrock surface. Deed restrictions would be placed on the landfill area, prohibiting future uses. Since the wastes remains onsite, 5-year reviews would be conducted.

EVALUATION OF ALTERNATIVES AND THE PREFERRED ALTERNATIVE - VAULT WASTES

EPA's preferred alternative for the vault wastes is cement *fixation* (Alternative 3) for the lower vault wastes, and *incineration* followed by *fixation* (Alternative 4) for the upper vault wastes. The treated wastes would be landfilled at an offsite hazardous waste disposal facility. This combination of alternatives will be referred to hereafter as the Preferred Alternative for the vault wastes.

Based on current information, the Preferred Alternative appears to provide the best balance of trade-offs among the alternatives with respect to the nine criteria that EPA uses to evaluate alternatives. This section profiles the performance of the preferred alternative against the nine criteria, noting how it compares to the other options under consideration. A glossary of the evaluation criteria is provided below.

OVERALL PROTECTION. If offsite landfill disposal is implemented, Alternatives 4 and 5 and the Preferred Alternative would provide protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. Alternatives 4 and 5 would be slightly more protective than the Preferred Alternative, since the minor amount of organic contamination in the lower vault wastes would also be destroyed during implementation of these alternatives. While there are risks associated with *arsenic* volatilization during the *incineration* or *vitrification* steps of Alternatives 4 and 5 and the Preferred Alternative, these risks would be controlled through the use of specialized air pollution control equipment. Alternative 3 with offsite landfill disposal would be somewhat less protective than the Preferred Alternative, since the organic contamination in the upper vault wastes would not be destroyed.

Alternatives 2 and 6 would be less protective of human health and the environment than the Preferred Alternative, since the wastes would not be treated to destroy the organic contaminants in the upper vault wastes and immobilize the *arsenic* in both the upper and lower vault wastes prior to landfill disposal. The alternatives that include onsite landfilling (Alternatives 2 and 6, and the onsite landfill options for Alternatives 3, 4, and 5) would be less protective of human health and the environment than the Preferred Alternative, because of the potential of landfill failure from sinkhole formation or other causes. Landfill failure could result in a substantial release of contaminants to *groundwater*.

* All costs and implementation times in this Proposed Plan are estimated.

The "no action" alternative is not protective of human health and the environment; therefore, it is not considered further in this analysis as an option for the vault wastes.

REGULATORY COMPLIANCE. Alternatives 3, 4, and 5 and the Preferred Alternative would meet the applicable or relevant and appropriate requirements (ARARs) of Federal and state laws, if the treated wastes are landfilled off site. Pennsylvania law does not allow construction of a hazardous waste landfill immediately above carbonate bedrock. Thus, the alternatives that include onsite landfilling (Alternatives 2 and 6, and the onsite landfill options for Alternatives 3, 4, and 5) would not comply with this ARAR. An ARAR waiver would be required to implement these alternatives. Alternatives 3, 4, and 5 and the Preferred Alternative should comply with the proposed LDR standards. *CERCLA* establishes a preference for alternatives that incorporate treatment; Alternatives 2 and 6 do not conform with this preference.

LONG-TERM EFFECTIVENESS AND PERMANENCE. The Preferred Alternative would reduce the hazards posed by the vault wastes by destroying the *organic compounds* present in the upper vault wastes and immobilizing the metals in the wastes. The long-term risk of exposure to the treated wastes at the Whitmoyer Laboratories Site would be eliminated by placing the treated wastes in an offsite landfill.

With offsite landfill disposal, Alternatives 4 and 5 would be slightly more effective in the long term and permanent, since the minor amount of organic contamination in the lower vault wastes would also be destroyed. Alternative 3 with offsite landfill disposal would be slightly less protective than the Preferred Alternative, since the upper vault waste organic contamination is not destroyed.

Alternatives 2 and 6 and the onsite landfill options of Alternatives 3, 4, and 5 would be less-effective in the long-term, because of the potential for landfill failure. If deed restrictions are not effective, direct exposure to the wastes in the future could result from construction activities. Alternatives 2 and 6 also do not include treatment of the vault's *arsenic* contamination to a less mobile state.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS THROUGH TREATMENT. Alternatives 3, 4, and 5 and the Preferred Alternative would treat the wastes to reduce toxicity, mobility, or volume. The Preferred Alternative would eliminate the toxicity of the organic contaminants in the upper vault wastes by thermal destruction, and would reduce the mobility of the *arsenic* in the wastes by *fixation*. Alternative 3 reduces the mobility of the organic and *arsenic* contaminants by microencapsulating the upper vault wastes and fixating the lower vault wastes. Alternatives 4 and 5 would eliminate the toxicity of the organic contaminants in the wastes by thermal destruction, and would reduce the mobility of *arsenic* by *fixation* in a cement matrix for Alternative 4 and *encapsulation* in a glass matrix for Alternative 5.

Alternatives 2 and 6 achieve no reduction in toxicity, mobility, or volume. Disposal without treatment is the least preferred option under *CERCLA*.

SHORT-TERM EFFECTIVENESS. The Preferred Alternative would be implemented within an estimated 36 months from the remedy selection date. All other alternatives would require an equal length of time, except Alternative 2, which would require 24 months for implementation, and Alternative 6, which would require 18 months for implementation.

There is a potential risk associated with *arsenic* volatilization, under Alternatives 4 and 5 and the Preferred Alternative. This risk would be addressed by the use of specialized air pollution control equipment. Under the Preferred Alternative and the offsite landfill disposal options of Alternatives 3, 4, and 5, there is some minor, short-term risk of exposure to the community during transportation of the treated wastes off site. Only minimal, short-term risks are associated with Alternatives 2 and 6 and the onsite landfill disposal option of Alternative 3, if proper adherence to worker safety procedures occurs.

IMPLEMENTABILITY. The various alternatives have few associated administrative difficulties that could delay implementation. Permits would be required for the offsite disposal of treated wastes. To confirm the suitability of the technology, treatability studies would be required prior to implementation for Alternatives 3 and 5. For Alternatives 3, 4, and 5, and the Preferred Alternative, treatment equipment and skilled workers are available but limited. The technology, equipment, and specialists required to implement Alternatives 2 and 6 would be readily available. For all of the alternatives, monitoring of air and water during implementation would be required. For each alternative but Alternatives 2 and 6, monitoring of the treated wastes would also be required. Long-term monitoring of landfill *leachate* and leak detection zones would be required for Alternatives 2 and 6, and the onsite landfill options of Alternatives 3, 4, and 5.

COST. The present-worth cost of the preferred alternative is $18,400,000. The lowest-cost alternative is Alternative 2 at $1,379,000. The highest cost alternative is Alternative 5 with offsite disposal, at $58,000,000. The other FS alternative costs are presented in the alternative description sections. The former owner's proposal, Alternative 6, does not include a cost estimate. Alternative 6 costs are likely to be slightly higher than the estimated costs for Alternative 2.

STATE ACCEPTANCE. The Commonwealth of Pennsylvania supports the Preferred Alternative without comment.

COMMUNITY ACCEPTANCE. Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for Operable Unit Two.

SUMMARY OF ALTERNATIVES - LAGOON WASTES

Alternatives 1 through 6 for the *lagoon* wastes are numbered to correspond with the numbers in the FS report. Alternative 7 is the alternative presented by the former site owners. The alternatives are the following:

- Alternative 1: No Action
- Alternative 2: Bulk Excavation/Landfill (Onsite or Offsite)
- Alternative 3: Bulk Excavation/*Fixation*/Landfill (Onsite or Offsite)
- Alternative 4: Bulk Excavation/*Incineration*/*Fixation*/Landfill (Onsite or Offsite)
- Alternative 5: In-situ *Vitrification* (Onsite Capping or Offsite Landfill)
- Alternative 6: Capping
- Alternative 7: On-site Enhanced Solids Containment System

COMMON ELEMENTS. The various *lagoon* waste alternatives being considered would include common components. Each alternative except Alternative 7 includes long-term *groundwater* monitoring in compliance with *RCRA*. These monitoring activities would be conducted to assess the effectiveness of the remedy. Alternatives 2, 3, 4, and 7 include excavation of the *lagoon* wastes and ultimate disposal of the wastes in a landfill. The excavated area would be backfilled with clean soil and regraded. The petroleum products pipeline and pump station passing through the *lagoon* area may have to be abandoned or relocated during excavation.

Alternatives 2 through 6 would consider *lagoon* wastes to be *lagoon* materials having an *arsenic* content greater than 10,000 mg/kg (1 percent). Alternative 7 would only consider *lagoon* wastes to be *lagoon* materials having an *arsenic* content greater than 20,000 mg/kg (2 percent). Contaminated *lagoon* materials not considered to be *lagoon* wastes would be considered contaminated soils. Contaminated soils will be addressed as a part of OU Three.

Alternative 1: NO ACTION

- Capital Cost: 0*
- Annual O&M Costs: $7,100*
- Present Worth: $109,000*
- Months to Implement: None*

Under the Superfund program, the "no action" alternative is required to be evaluated at every site to establish a baseline for comparison with the other alternatives. Under this alternative, EPA would take no actions other than annual *groundwater* monitoring around the *lagoon* sites and performing reviews every 5 years.

Alternative 2: BULK EXCAVATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $4,890,000 (Onsite LF), $18,440,000 (Offsite LF)*
- Annual O&M Costs: $22,900 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $5,375,000 (Onsite LF), $18,440,000 (Offsite LF)*
- Months to Implement: 24*

All 24,000 *C.Y.* of *lagoon* wastes (containing greater than 1 percent *arsenic*) would be excavated and placed in either a new onsite landfill or an existing offsite *RCRA* Subtitle C (hazardous waste) landfill. The landfill would be designed to meet or exceed all *RCRA* standards. For the onsite landfill, the landfill liner base would be designed to minimize threats posed by sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. If the wastes were landfilled on site, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 3: BULK EXCAVATION/FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $10,500,000 (Onsite LF), $22,900,000 (Offsite LF)*
- Annual O&M Costs: $35,200 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $11,100,000 (Onsite LF), $22,900,000 (Offsite LF)*
- Months to Implement: 36*

Following excavation, the 24,000 *C.Y.* of *lagoon* wastes (containing greater than 1 percent *arsenic*) would be fixated using iron compounds. This treatment would occur on site. The *fixation* unit would comply with technical standards for hazardous waste miscellaneous treatment units. The *arsenic* mobility in the *lagoon* wastes would probably be reduced by approximately

* All costs and implementation times in this Proposed Plan are estimated.

67 percent. The degree of reduction in *arsenic* mobility for the treated wastes can not be predicted with certainty. A treatability study would be conducted prior to full-scale implementation to validate the proposed treatment. Alternative 3 should comply with the proposed LDR standards that apply to the *lagoon* wastes.

The treated (residual) wastes would be placed in either a new onsite landfill or an existing offsite landfill. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 4: BULK EXCAVATION/INCINERATION/ FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $60,570,000 (Onsite LF), $80,700,000 (Offsite LF)*
- Annual O&M Costs: $40,200 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $60,630,000 (Onsite LF), $80,700,000 (Offsite LF)*
- Months to Implement: 36*

The *lagoon* wastes (containing greater than 1 percent *arsenic*) would be excavated and incinerated to destroy the minor amounts of organics present, and to change the *arsenic* to a form more amenable to cement *fixation*. To capture contaminants in the exhaust air and thus ensure compliance with Clean Air Act standards, specialized air pollution control equipment would be applied. The *incineration* ash would be fixated using cement. Both the *incineration* and *fixation* would take place on site using mobile equipment. The *incineration* and *fixation* units would comply with technical standards for incinerators and miscellaneous treatment units, respectively. The *arsenic* mobility of the wastes would be reduced by approximately 82 percent. Alternative 4 should comply with the proposed LDR standards that apply to the *lagoon* wastes.

The *residual wastes* would be placed in either a new onsite landfill or an existing offsite landfill. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of landfill failure from sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

* All costs and implementation times in this Proposed Plan are estimated.

Alternative 5: IN-SITU VITRIFICATION (ONSITE CAPPING OR OFFSITE LANDFILL)

- Capital Cost: $15,900,000 (Onsite Capping), $24,200,000 (Offsite LF)*
- Annual O&M Costs: $28,100 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $16,400,000 (Onsite LF), $24,200,000 (Offsite LF)*
- Months to Implement: 36*

Under Alternative 5, the approximately 7,000 *C.Y.* of *lagoon* wastes (containing greater than 1 percent *arsenic*) located in the western *lagoon* area would be excavated and mixed with the approximately 17,000 *C.Y.* of *lagoon* wastes in the eastern *lagoon* area. The mixture would then be heated in place (in situ), using electricity passing through graphite electrodes, until the mixture formed a pool of molten glass. The minor organic contaminants would be destroyed during heating, while the metal contaminants would become trapped in the glass during the subsequent cooling step. Specialized air pollution control equipment would be applied to capture contaminants in the exhaust air and thus ensure compliance with Clean Air Act standards. The *vitrification* unit would comply with technical standards for miscellaneous treatment units. The mobility of the *arsenic* in the wastes would be reduced by approximately 90 percent. Alternative 5 should comply with the proposed LDR standards that apply to the *lagoon* wastes.

The treated wastes would either be placed in an existing offsite landfill, or covered with a *cap* designed to meet the *RCRA landfill closure* requirements. If the treated wastes were capped in place, a *groundwater* removal (drainage) system would be placed around the wastes to prevent *groundwater* contact with them. Also, deed restrictions would be placed on the disposal area, and annual *groundwater* monitoring and 5-year reviews would be conducted. Both the in-place capping and offsite landfill disposal options would comply with disposal ARARs.

Alternative 6: CAPPING

- Capital Cost: $1,524,000*
- Annual O&M Costs: $31,400*
- Present Worth: $2,000,000*
- Months to Implement: 18*

The approximately 7,000 *C.Y.* of *lagoon* wastes (containing greater than 1 percent *arsenic*) located in the western *lagoon* area would be excavated and placed on top of the approximately 17,000 *C.Y.* of *lagoon* wastes in the eastern *lagoon* area. The consolidated wastes would then be covered with a *cap* designed to meet the *RCRA landfill closure* requirements. A *groundwater* removal (drainage) system would be placed around the wastes to prevent

groundwater contact with them. Deed restrictions would be placed on the disposal area, and annual *groundwater* monitoring and 5-year reviews would be conducted. Alternative 6 would comply with all ARARs.

Alternative 7: ON-SITE ENHANCED SOLIDS CONTAINMENT SYSTEM

- Capital Cost, Annual O&M Costs, and Present Worth: Cost estimates were not provided in the former owners' proposal. Costs are likely to be lower than the estimated costs for Alternative 2, since only *lagoon* wastes containing greater than 2 percent *arsenic* are being addressed. Alternative 2 (and the other alternatives) address all *lagoon* materials containing greater than 1 percent *arsenic.**
- Months to Implement: 18*

The *lagoon* wastes containing greater than 2 percent *arsenic* would be excavated and placed in a new landfill constructed on site. The landfill would be designed to meet or exceed all *RCRA* standards. To provide protection against sinkhole collapse and subsequent landfill failure, a foundation preparation program would be implemented prior to landfill construction. The program would consist of (1) geophysical surveying of the landfill area; (2) drilling exploration borings on a selected grid pattern and at any geophysical anomalies; (3) pressure grouting any voids discovered in the exploration borings; (4) removing any soil above bedrock and any easily removable rock; and (5) placing aggregate in bedrock joint openings and above the bedrock surface. Deed restrictions would be placed on the landfill area, prohibiting future uses. Since the wastes remains onsite, 5-year reviews would be conducted.

EVALUATION OF ALTERNATIVES AND THE PREFERRED ALTERNATIVE - LAGOON WASTES

EPA's preferred alternative for the *lagoon* wastes is iron *fixation* (Alternative 3), with the treated wastes being landfilled off site. This alternative will be referred to hereafter as the Preferred Alternative for the *lagoon* wastes.

The Preferred Alternative appears to provide the best balance of trade-offs among the *lagoon* waste alternatives with respect to nine criteria that EPA uses to evaluate alternatives, based on current information. This section profiles the performance of the Preferred Alternative against the nine criteria, noting how the Preferred Alternative compares to the other options under consideration.

OVERALL PROTECTION. The Preferred Alternative and the offsite disposal options of Alternatives 4 and 5 would provide protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. Alternatives 4 and 5 would be slightly more protective than the Preferred Alternative since the minor amounts of organics in the *lagoon* wastes would be destroyed during implementation of these alternatives. Although there are risks associated with *arsenic* volatilization during the *incineration* or *vitrification* steps of Alternatives 4 and 5, these risks would be managed through the use of specialized air pollution control equipment.

The alternatives that include onsite containment of the *lagoon* wastes (Alternatives 6 and 7, the onsite landfill options for Alternatives 2, 3, and 4, and the in-place capping option for Alternative 5) would be less protective of human health and the environment than the Preferred Alternative, because of the potential of containment system failure from sinkhole formation or other causes. Containment system failure could result in a substantial release of contaminants to *groundwater*.

The "no action" alternative is not protective of human health and the environment; therefore, it is not considered further in this analysis as an option for the *lagoon* wastes.

REGULATORY COMPLIANCE. The Preferred Alternative and the offsite disposal options of Alternatives 4 and 5 would meet their respective ARARs. Pennsylvania law does not allow construction of a hazardous waste or *residual waste* landfill immediately above any sinkhole-prone carbonate bedrock. Thus, Alternative 7 and the onsite landfill options of Alternatives 2, 3, and 4 would not comply with this ARAR. The Preferred Alternative and Alternatives 4 and 5 should comply with the proposed LDR standards. The offsite landfill option of Alternative 2 may not comply with the proposed LDR standards. Alternatives 2, 6, and 7 would not comply with the *CERCLA* preference for treatment.

LONG-TERM EFFECTIVENESS AND PERMANENCE. The Preferred Alternative would reduce the hazards posed by the *lagoon* wastes by fixating the *arsenic* in the wastes. The long-term risk of exposure to the treated wastes at the Whitmoyer Laboratories Site would be eliminated by placing the treated wastes in an offsite landfill.

The offsite disposal options for Alternatives 4 and 5 would be slightly more protective than the Preferred Alternative, since the minor organic contamination in the *lagoon* wastes would be destroyed.

The alternatives that include onsite containment of the *lagoon* wastes (Alternatives 6 and 7, the onsite landfill options for Alternatives 2, 3, and 4, and the in-place capping option for Alternative 5) would be less protective of human health and the environment than

the Preferred Alternative, because of the potential for the containment system to fail from sinkhole formation or other causes. The onsite containment system would require long-term maintenance, and portions of it might need to be replaced in the future. If deed restrictions are not effective, direct exposure to the wastes in the future could result from construction activities.

Alternative 6 and the in-place capping option of Alternative 5 are less protective than the other alternatives that include landfill disposal (the Preferred Alternative, Alternatives 2, 4, and 7, and the offsite disposal option of Alternative 5), since the wastes would not be contained in a landfill having liner and leachate detection systems.

Alternatives 2 and 6 do not provide for treatment of the mobile *arsenic* contamination in the *lagoon* waste.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS THROUGH TREATMENT. The Preferred Alternative and Alternatives 4 and 5 would treat the wastes to reduce toxicity, mobility, or volume. The Preferred Alternative would reduce the mobility of the *arsenic* in the wastes by *fixation* with iron. Alternatives 4 and 5 would eliminate the toxicity of the organic contaminants in the wastes by thermal destruction, and would reduce the mobility of *arsenic* by *fixation* in a cement matrix for Alternative 4 and *encapsulation* in a glass matrix for Alternative 5.

No reduction in toxicity, mobility, or volume is realized for Alternatives 2, 6, and 7. Disposal without treatment is the least preferred option under *CERCLA*.

SHORT-TERM EFFECTIVENESS. The Preferred Alternative would be implemented within an estimated 36 months from the remedy selection date. All other alternatives would require an equal length of time, except Alternative 2, which would require 24 months for implementation, and Alternatives 6 and 7, which would require 18 months for implementation.

There is a potential risk associated with *arsenic* volatilization under Alternatives 4 and 5. This risk would be addressed by the use of specialized air pollution control equipment. There is some minor, short-term risk of exposure to the community during transportation of the treated wastes off site, under the Preferred Alternative and the offsite landfill disposal options of Alternatives 2, 4, and 5. If worker safety procedures are properly adhered to, only minimal, short-term risks are associated with Alternatives 6 and 7, and the onsite landfill disposal options of Alternatives 2 and 3.

IMPLEMENTABILITY. The various alternatives have few associated administrative difficulties that could delay implementation. Permits would be required for the offsite disposal of the treated or untreated wastes. Treatability studies would be required prior to implementation of the Preferred Alternative and Alternative 5, to confirm the suitability of the technology. For Alternatives 4 and 5 and the Preferred Alternative, treatment equipment and skilled workers would be available but limited. The technology, equipment, and specialists required to implement Alternatives 2, 6, and 7 would be readily available. For all of the alternatives, monitoring of air and water during implementation would be required. For Alternatives 3, 4, and 5, monitoring of the treated wastes would also be required. Long-term monitoring of landfill *leachate* and leak detection zones would be required for Alternative 7 and the onsite disposal options of Alternatives 2, 3, and 4.

COST. The present-worth cost of the Preferred Alternative for the *lagoon* wastes is $22,900,000. The lowest-cost alternative is Alternative 2 (onsite landfill option), at $5,375,000. The highest cost alternative is Alternative 4 with offsite disposal, at $80,700,000. The other FS alternative costs are presented in the alternative description sections. The former owner's proposal, Alternative 7, does not include a cost estimate. Alternative 7 costs are likely to be somewhat lower than the estimated costs for Alternative 2 (onsite landfill option).

STATE ACCEPTANCE. The Commonwealth of Pennsylvania supports the Preferred Alternative without comment.

COMMUNITY ACCEPTANCE. Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for Operable Unit Two.

SUMMARY OF ALTERNATIVES - MISCELLANEOUS PRODUCTS/ FEEDSTOCKS

Alternatives 1 through 5 for the miscellaneous products/feedstocks are numbered to correspond with the alternative numbers in the FS report. Alternative 6 is the alternative presented by the former site owners. The alternatives are the following:

- Alternative 1: No Action
- Alternative 2: Bulk Excavation/Landfill (Onsite or Offsite)
- Alternative 3: Bulk Excavation/*Fixation*/Landfill (Onsite or Offsite)
- Alternative 4: Bulk Excavation/*Incineration*/*Fixation*/Landfill (Onsite or Offsite)
- Alternative 5: Bulk Excavation/*Vitrification*/Landfill (Onsite or Offsite)
- Alternative 6: On-site Enhanced Solids Containment System

COMMON ELEMENTS. All of the miscellaneous products/feedstocks alternatives being considered would include common components. Each alternative except the "no action" alternative and Alternative 6 would include long-term *groundwater* monitoring in compliance with *RCRA*. These monitoring efforts would be conducted to assess the effectiveness of the remedy. Alternatives 2 through 6 include excavation of the miscellaneous products/feedstocks and ultimate disposal in a landfill. For Alternatives 2 through 5, the miscellaneous products/feedstocks would be segregated into hazardous and nonhazardous wastes. The nonhazardous wastes would be directly disposed in an offsite permitted landfill.

Alternative 1: NO ACTION

- Capital Cost: 0*
- Annual O&M Costs: $7,100*
- Present Worth: $109,000*
- Months to Implement: None*

The "no action" alternative is required under the Superfund program at every site, to establish a baseline for comparison with the other alternatives. Under this alternative, EPA would take no actions other than performing reviews every 5 years.

Alternative 2: BULK EXCAVATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $13,900 (Onsite LF), $82,500 (Offsite LF)*
- Annual O&M Costs: $0*
- Present Worth: $13,900 (Onsite LF), $82,500 (Offsite LF)*
- Months to Implement: 24*

The 101 C.Y. of miscellaneous products/feedstocks would be excavated and segregated into hazardous and nonhazardous wastes. The nonhazardous wastes would be disposed in an offsite landfill legally able to accept these wastes. The hazardous wastes would be placed in either a new onsite landfill or an existing offsite *RCRA* Subtitle C landfill. Because of the relatively small volume of miscellaneous products/feedstocks, onsite disposal of the hazardous wastes would only occur if an onsite landfill is constructed for another one of the site's waste streams. For the onsite landfill option, the landfill liner base would be engineered to minimize the threats posed by sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. If the wastes were landfilled on site, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 3: BULK EXCAVATION/FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $50,900 (Onsite LF), $271,000 (Offsite LF)*
- Annual O&M Costs: $0*
- Present Worth: $50,900 (Onsite LF), $271,000 (Offsite LF)*
- Months to Implement: 36*

The 101 C.Y. of miscellaneous products/feedstocks would be excavated and segregated into hazardous and nonhazardous wastes. The nonhazardous wastes would be disposed in an offsite landfill legally able to accept these wastes. The hazardous wastes would be fixated with cement, either on site or off site. Because of the relatively small volume of hazardous miscellaneous products/feedstocks, onsite *fixation* of these wastes would only be implemented if onsite *fixation* is applied to one of the other site waste streams. The *fixation* unit would comply with technical standards for hazardous waste miscellaneous treatment units. Alternative 3 should comply with the proposed land disposal restriction (LDR) standards that apply to the miscellaneous products/feedstocks.

The fixated wastes would be placed in either a new onsite landfill or an existing offsite landfill. Onsite landfilling would only occur if a landfill is constructed on site for another one of the site's waste streams. the wastes were landfilled on site, the landfill bas would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 4: BULK EXCAVATION/INCINERATION/ FIXATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $291,000 (Onsite LF), $371,000 (Offsite LF)*
- Annual O&M Costs: $0*
- Present Worth: $291,000 (Onsite LF), $371,000 (Offsite LF)*
- Months to Implement: 36*

The 101 C.Y. of miscellaneous products/feedstocks would be excavated and segregated into hazardous and nonhazardous wastes. The nonhazardous wastes would be disposed in an offsite landfill legally able to accept these wastes. The hazardous wastes would be incinerated on site or off site, with the ash being fixated with cement. The miscellaneous products/feedstocks would be incinerated to destroy the orgar contaminants and to change the metals to a form mc amenable to cement *fixation*. Because of the relatively small volume of hazardous miscellaneous products/feedstocks, onsite *incineration* of the wastes would only be implemented if onsite *incineration* is

* All costs and implementation times in this Proposed Plan are estimated.

implemented for the vault or *lagoon* wastes. To ensure compliance with Clean Air Act standards, air pollution control equipment would be employed. If onsite treatment occurs, both the *incineration* and *fixation* would take place on site using mobile equipment. The *incineration* and *fixation* units would comply with technical standards for incinerators and miscellaneous treatment units, respectively. Alternative 4 should comply with the proposed LDR standards that apply to the miscellaneous products/feedstocks.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill. Onsite landfilling would only occur if a landfill is constructed on site for another one of the site's waste streams. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 5: BULK EXCAVATION/ VITRIFICATION/ LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $1,067,000 (Onsite LF), $1,962,000 (Offsite LF)*
- Annual O&M Costs: $0*
- Present Worth: $1,067,000 (Onsite LF), $1,962,000 (Offsite LF)*
- Months to Implement: 36*

The 101 *C.Y.* of miscellaneous products/feedstocks would be excavated and segregated into hazardous and nonhazardous wastes. The nonhazardous wastes would be placed in an offsite landfill legally able to accept these wastes. The hazardous wastes would be mixed with other materials having a low organic content (possibly including other site wastes) and vitrified on site. Mixing the miscellaneous products/feedstocks with other materials is necessary to dilute the overall organic content to a level that the *vitrification* equipment can handle. Because of the relatively small volume of hazardous miscellaneous products/feedstocks, *vitrification* would only be implemented if *vitrification* is implemented for another site waste stream. The *vitrification* would destroy the organic contaminants; the metal contaminants would become trapped in the glass during the subsequent cooling step. Specialized air pollution control equipment would be applied to ensure compliance with Clean Air Act standards. The *vitrification* unit would comply with technical standards for miscellaneous treatment units. Alternative 5 should comply with the proposed LDR standards that apply to the miscellaneous products/feedstocks.

The vitrified wastes would be placed in either a new onsite landfill or an existing offsite landfill. Onsite landfilling would only occur if a landfill is constructed on site for another one of the site's waste streams. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual *groundwater* monitoring and 5-year reviews would be conducted.

Alternative 6: ON-SITE ENHANCED SOLIDS CONTAINMENT SYSTEM

- Capital Cost, Annual O&M Costs, and Present Worth: Cost estimates were not provided in the former owners' proposal. Costs are likely to be slightly higher than the estimated costs for Alternative 2.*
- Months to Implement: 18*

The miscellaneous products/feedstocks would be excavated and placed in a new landfill constructed on site. The landfill would be designed to meet or exceed all *RCRA* standards. To provide protection against sinkhole collapse and subsequent landfill failure, a foundation preparation program would be implemented prior to landfill construction. The program would consist of (1) geophysical surveying of the landfill area; (2) drilling exploration borings on a selected grid pattern and at any geophysical anomalies; (3) pressure grouting any voids discovered in the exploration borings; (4) removing any soil above bedrock and any easily removable rock; and (5) placing aggregate in bedrock joint openings and above the bedrock surface. Deed restrictions would be placed on the landfill area, prohibiting future uses. Since the wastes remains onsite, 5-year reviews would be conducted. Alternative 6 would not comply with the Pennsylvania hazardous waste facility siting criteria, which prohibit the construction of a hazardous waste landfill over limestone or carbonate formations.

EVALUATION OF ALTERNATIVES AND THE PREFERRED ALTERNATIVE - MISCELLANEOUS PRODUCTS/ FEEDSTOCKS

EPA's preferred alternative for the miscellaneous products/feedstocks is Alternative 4, with the wastes exhibiting hazardous characteristics being incinerated on site in a mobile *incineration* unit, followed by onsite *fixation* of the incinerator ash and landfilling of the fixated waste off site. The nonhazardous miscellaneous feedstocks would be directly deposited in an offsite landfill. This alternative will be referred to hereafter as the Preferred Alternative for the miscellaneous products/feedstocks.

* All costs and implementation times in this Proposed Plan are estimated.

Based on current information, the Preferred Alternative appears to provide the best balance of trade-offs among the miscellaneous products/feedstocks alternatives with respect to the nine criteria that EPA uses to evaluate alternatives. This section profiles the performance of the Preferred Alternative against these nine criteria, noting how the Preferred Alternative compares to the other options under consideration.

OVERALL PROTECTION. The Preferred Alternative and Alternatives 3 and 5 would provide protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls. The Preferred Alternative and Alternative 5 would be slightly more protective than Alternative 3, since Alternative 3 would not result in the destruction of the minor amount of organic contaminants present in the wastes.

Alternatives 2 and 6 would be less protective of human health and the environment than the Preferred Alternative, since the wastes would not be treated to destroy organic contaminants and immobilize the *arsenic* in the wastes.

The "no action" alternative is not protective of human health and the environment, and is not considered further in this analysis as an option for the miscellaneous products/feedstocks.

REGULATORY COMPLIANCE. The Preferred Alternative and the offsite disposal options for Alternatives 3 and 5 would meet their respective ARARs. Pennsylvania law does not allow construction of a hazardous waste or *residual waste* landfill immediately above any sinkhole-prone carbonate bedrock. Thus, Alternative 6 and the onsite landfill option of Alternatives 2, 3, 4, and 5 would not comply with this ARAR. The Preferred Alternative and Alternatives 3 and 5 should comply with the proposed LDR standards. The offsite landfill option of Alternative 2 probably would not comply with the proposed LDR standards. Alternatives 2 and 6 would not comply with the *CERCLA* preference for treatment.

LONG-TERM EFFECTIVENESS AND PERMANENCE. The Preferred Alternative would reduce the hazards posed by the miscellaneous products/feedstocks by thermally destroying the organic contaminants and fixating the metals in the incinerator ash. The long-term risk of exposure to the treated wastes at the Whitmoyer Laboratories Site would be reduced by placing the treated wastes in an offsite landfill. The Preferred Alternative would be slightly more protective than Alternative 3, since Alternative 3 would not result in the destruction of organic contaminants.

The alternatives that include onsite containment of the miscellaneous products/feedstocks (Alternative 6 and the onsite landfill options of Alternatives 2, 3, 4, and 5) would be less protective of human health and the environment than the Preferred Alternative, because of the potential for the onsite landfill to fail from sinkhole formation or other causes. The onsite landfill would require long-term maintenance, and portions of it might need to be replaced in the future. If deed restrictions are not effective, direct exposure to the wastes in the future could result from construction activities.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS THROUGH TREATMENT. The Preferred Alternative and Alternatives 3 and 5 would treat the wastes to reduce toxicity, mobility, or volume. The Preferred Alternative and Alternative 5 would eliminate the toxicity of the organic contaminants in the wastes by thermal destruction. The Preferred Alternative and Alternative 3 would reduce the mobility of the metals in the wastes by *fixation* in a cement matrix, whereas Alternative 5 would reduce the metals' mobility by *encapsulation* in a glass matrix.

No reduction in toxicity, mobility, or volume is realized for Alternatives 2 and 6. Disposal without treatment is the least preferred option under *CERCLA*.

SHORT-TERM EFFECTIVENESS. The Preferred Alternative would be implemented within an estimated 24 months from the remedy selection date. An equal length of time would be necessary to implement all of the other options except Alternative 6. This alternative would be implemented in 18 months.

There is some minor, short-term risk of exposure to the community during transportation of the treated wastes off site, under the Preferred Alternative and the offsite landfill disposal options of Alternatives 2, 3, and 5. If worker safety procedures are properly adhered to, only minimal, short-term risks are associated with Alternative 6 and the onsite landfill disposal option of Alternatives 2 through 5.

IMPLEMENTABILITY. The various alternatives have few associated administrative difficulties that could delay implementation. Permits would be required for the offsite disposal of the treated or untreated wastes. For Alternatives 3 and 5 and the Preferred Alternative, treatment equipment and skilled workers would be available but limited. The technology, equipment, and specialists required to implement Alternatives 2 and 6 would be readily available. For all of the alternatives, monitoring of air and water during implementation would be required. For the Preferred Alternative and Alternatives 3 and 5, monitoring of the treated waste would also be required. Long-term monitoring of landfill *leachate* and leak detection zones would be required for Alternative 6 and the onsite landfill options of Alternatives 2, 3, 4, and 5.

COST. The present-worth cost of the Preferred Alternative is $371,000. The lowest-cost alternative is Alternative 2 (onsite landfill option) at $13,900. The highest cost alternative is Alternative 5 with offsite disposal, at $1,962,000. The other FS alternative costs are presented in the alternative description sections. The former owner's proposal, Alternative 6, does not include a cost estimate. Alternative 6 costs are likely to be slightly higher than the estimated costs for Alternative 2.

STATE ACCEPTANCE. The Commonwealth of Pennsylvania supports the Preferred Alternative without comment.

COMMUNITY ACCEPTANCE. Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for Operable Unit Two.

SUMMARY OF ALTERNATIVES - SITE STRUCTURES

The remedial program proposed by the former owners did not address the site structures, with the sole exception of the vault structure. Under the former owner remedial program, the vault structure would be placed in the on-site enhanced solids containment system. Since the former owner remedial program did not address the majority of contaminated site structures, it will not be considered a site structure remedial alternative, and will not be discussed further in the analysis of site structures remedial alternatives.

The remedial alternatives for the site structures are numbered to correspond with the alternative numbers in the FS report. The alternatives are the following:

- Alternative 1: No Action
- Alternative 2: Demolition/Bulk Excavation, Surface Treatment/Landfill (Onsite or Offsite)
- Alternative 3: Demolition/Bulk Excavation, Surface Treatment/*Incineration*/Landfill (Onsite or Offsite)
- Alternative 4: Demolition/Bulk Excavation, Surface Treatment/*Vitrification*/Landfill (Onsite or Offsite)

COMMON ELEMENTS. Alternatives 2 through 4 contain several common elements. Under each alternative, those site structures with only surface contamination would be surface cleaned, and the more contaminated Building 1-7 complex would be demolished and excavated. All tanks, vessels, piping, and process equipment would also be demolished. The demolition debris would be segregated into nonhazardous and hazardous components. The nonhazardous components would be directly disposed in an onsite or offsite landfill. The hazardous materials would also ultimately be disposed in a landfill. Dangerous conditions existing in buildings outside of the Building 1-7 complex would be remediated.

Alternative 1: NO ACTION

- Capital Cost: 0*
- Annual O&M Costs: $3,600*
- Present Worth: $55,600*
- Months to Implement: None*

The "no action" alternative is required under the Superfund program at every site, to establish a baseline for comparison with the other alternatives. Under this alternative, EPA would take no actions other than performing reviews every 5 years.

Alternative 2: DEMOLITION/BULK EXCAVATION, SURFACE TREATMENT/LANDFILL

- Capital Cost: $2,000,000 (Onsite LF), $4,000,000 (Offsite LF)*
- Annual O&M Costs: $3,600 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $2,056,000 (Onsite LF), $4,000,000 (Offsite LF)*
- Months to Implement: 24*

Under Alternative 2, all of the site structures with surface contamination would be surface cleaned. Dangerous conditions existing in buildings outside of the Building 1-7 complex would be remediated. The Building 1-7 complex and all tanks, vessels, piping, and process equipment would be demolished and excavated. The demolition debris would be segregated into nonhazardous and hazardous components. The nonhazardous components would be disposed in an onsite landfill or an offsite landfill legally able to accept the debris. The hazardous materials would be placed in an either an onsite landfill or an offsite *RCRA* Subtitle C landfill.

For the onsite landfill option, the landfill liner base would be engineered to minimize the threats posed by sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. If the wastes were landfilled on site, annual *groundwater* monitoring and 5-year reviews would be conducted. The onsite landfill option would not comply with the Pennsylvania hazardous waste landfill siting regulations for the hazardous site structures, and the *residual waste* landfill siting regulations for the nonhazardous debris.

* All costs and implementation times in this Proposed Plan are estimated.

Alternative 3: DEMOLITION/BULK EXCAVATION, SURFACE TREATMENT/INCINERATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $2,440,000 (Onsite LF), $4,100,000 (Offsite LF)*
- Annual O&M Costs: $3,600 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $2,500,000 (Onsite LF), $4,100,000 (Offsite LF)*
- Months to Implement: 36*

Under Alternative 3, all of the site structures with surface contamination would be surface cleaned. Dangerous conditions existing in buildings outside of the Building 1-7 complex would be remediated. The Building 1-7 complex and all tanks, vessels, piping, and process equipment would be demolished and excavated. The demolition debris would be segregated into nonhazardous and hazardous components. The nonhazardous components would either be disposed in an onsite landfill or an offsite landfill legally able to accept the debris, or salvaged. The hazardous materials would be divided into three groups: combustible materials (such as the wood flooring); impermeable materials (such as the steel tanks); and permeable materials (such as the concrete dikes). The combustible materials would be incinerated, with the ash being fixated with cement. The impermeable materials would be cleaned with either water or steam. The permeable materials would be coated and sealed to immobilize the contaminants. Alternative 3 should comply with the proposed LDR standards that apply to the site structure materials.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual groundwater monitoring and 5-year reviews would be conducted.

Alternative 4: DEMOLITION/BULK EXCAVATION, SURFACE TREATMENT/VITRIFICATION/LANDFILL (ONSITE OR OFFSITE)

- Capital Cost: $5,490,000 (Onsite LF), $7,400,000 (Offsite LF)*
- Annual O&M Costs: $3,600 (Onsite LF), $0 (Offsite LF)*
- Present Worth: $5,500,000 (Onsite LF), $7,400,000 (Offsite LF)*
- Months to Implement: 36*

Under Alternative 4, all of the site structures with surface contamination would be surface cleaned. Dangerous conditions existing in buildings outside of the Building 1-7 complex would be remediated. The Building 1-7 complex and all tanks, vessels, piping, and process equipment would be demolished and excavated. The demolition debris would be segregated into nonhazardous and hazardous components. The nonhazardous components would either be disposed in an onsite landfill or an offsite landfill legally able to accept the debris, or salvaged. The hazardous materials would be divided into three groups: combustible materials (such as the wood flooring); impermeable materials (such as the steel tanks); and permeable materials (such as the concrete dikes). The combustible materials would be vitrified. The metal contaminants would become trapped in the glass during the subsequent cooling step. The impermeable materials would be cleaned with either water or steam. The permeable materials would be coated and sealed to immobilize the contaminants. Alternative 4 should comply with the proposed LDR standards that apply to the site structure materials.

The treated wastes would be placed in either a new onsite landfill or an existing offsite landfill. If the wastes were landfilled on site, the landfill base would be designed to minimize the threat of sinkhole collapse. Deed restrictions would be placed on the landfill area, prohibiting future uses. In addition, annual groundwater monitoring and 5-year reviews would be conducted.

EVALUATION OF ALTERNATIVES AND THE PREFERRED ALTERNATIVE - SITE STRUCTURES

EPA's preferred alternative for the structures is Alternative 3, with offsite disposal. All of the site structures with surface contamination would be surface cleaned. Dangerous conditions existing in buildings outside of the Building 1-7 complex would be remediated. The Building 1-7 complex and all tanks, vessels, piping, and process equipment would be demolished and excavated. Nonhazardous debris would either be disposed in an offsite landfill, or salvaged. The hazardous materials would be treated by either *incineration* followed by *fixation*; surface cleaning; or coating and sealing. The treated wastes would be landfilled off site. Alternative 3 will be referred to hereafter as the Preferred Alternative for the site structures.

Based on current information, the Preferred Alternative appears to provide the best balance of trade-offs among the remedial alternatives for the site structures with respect to the nine criteria that EPA uses to evaluate alternatives. This section profiles the performance of the Preferred Alternative against these nine criteria, noting how the Preferred Alternative compares to the other options under consideration.

* All costs and implementation times in this Proposed Plan are estimated.

OVERALL PROTECTION. The Preferred Alternative and Alternative 4 would provide protection of human health and the environment by eliminating, reducing, or controlling risk through treatment, engineering controls, or institutional controls.

Alternative 2 would be less protective of human health and the environment than the Preferred Alternative, since the wastes would not be treated to destroy organic contaminants and immobilize the *arsenic* in the wastes.

The remedial options that include onsite landfilling of the site structures (the onsite landfill options for Alternatives 2, 3, and 4) would be less protective of human health and the environment than the Preferred Alternative, because of the potential of landfill failure from sinkhole formation or other causes. Landfill failure could result in a substantial release of contaminants to *groundwater*.

The "no action" alternative is not protective of human health and the environment, and is not considered further in this analysis as an option for the site structures.

REGULATORY COMPLIANCE. The Preferred Alternative and the offsite disposal option of Alternative 4 would meet their respective ARARs. Pennsylvania law does not allow construction of a hazardous waste or *residual waste* landfill immediately above sinkhole-prone carbonate bedrock. Thus, the onsite landfill option of Alternatives 2, 3, and 4 would not comply with this ARAR. The Preferred Alternative and Alternative 4 should comply with the proposed LDR standards. The offsite landfill option of Alternative 2 probably would not comply with the proposed LDR standards. Alternative 2 would not comply with the *CERCLA* preference for treatment.

LONG-TERM EFFECTIVENESS AND PERMANENCE. The Preferred Alternative would reduce the hazards posed by the site structures by cleaning site structures having contaminated surface buildups; remedying dangerous conditions in the buildings; demolishing the most contaminated structures; thermally destroying the organic contaminants and fixating the metals in the demolished combustible materials; surface cleaning the demolished permeable materials; and immobilizing the contaminants in the demolished permeable materials. The long-term risk of exposure to the treated wastes at the Whitmoyer Laboratories Site would be reduced by placing the wastes in an offsite landfill. The Preferred Alternative and Alternative 4 would be more protective than Alternative 2, since the contaminants would either be destroyed or immobilized by treatment.

The alternatives that include onsite containment of the site structures debris (the onsite landfill options of Alternatives 2, 3, and 4) would be less protective o human health and the environment than the Preferrec Alternative, because of the potential for the onsit landfill to fail from sinkhole formation or other causes The onsite containment system would require long term maintenance, and portions of it might need to be replaced in the future. If deed restrictions are no effective, direct exposure to the wastes in the future could result from construction activities.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME OF THE CONTAMINANTS THROUGH TREATMENT. The Preferred Alternative and Alternative 4 would treat the hazardous debris to reduce toxicity, mobility, or volume. The Preferred Alternative and Alternative 4 would eliminate the toxicity of the organic contaminants in the combustible materials by thermal destruction. The Preferred Alternative and Alternative 4 would reduce the mobility of the contaminants in the other hazardous site structures using immobilization technologies. The Preferred Alternative would immobilize the metals in the combustible materials by fixating the incinerator ash, whereas Alternative 4 would reduce the mobility of the metals in the combustible materials by encapsulating them in a glass matrix.

No reduction in toxicity, mobility, or volume is realized for Alternative 2. Disposal without treatment is the least preferred option under *CERCLA*.

SHORT-TERM EFFECTIVENESS. The Preferred Alternative would be implemented within an estimated 24 months from the remedy selection date. An equal length of time would be necessary to implement all of the other options.

There is some minor, short-term risk of exposure to the community during transportation of the treated wastes off site, under the Preferred Alternative and the offsite landfill disposal options of Alternatives 2 and 4. If worker safety procedures are properly adhered to, only minimal, short-term risks are associated with the onsite landfill disposal options of the remedial alternatives.

IMPLEMENTABILITY. The various alternatives have few associated administrative difficulties that could delay implementation. Permits would be required for the offsite disposal of the treated or untreated wastes. For the Preferred Alternative and Alternative 4, thermal treatment equipment and skilled workers would be available but limited. The technology, equipment, and specialists required to implement Alternative 2 would be readily available. For all of the alternatives, monitoring of air and water during implementation would be required. For the Preferred Alternative and Alternative 4, monitoring of the treated wastes would also be required. Long-term monitoring of landfill *leachate* and leak detection zones would be required for the onsite landfill options of Alternatives 2, 3, and 4.

COST. The present-worth cost of the Preferred Alternative is $4,100,000. The lowest-cost alternative is Alternative 2 (onsite landfill option) at $2,056,000. The highest cost alternative is Alternative 4 with offsite disposal, at $7,400,000. The other FS alternative costs are presented in the alternative description sections.

STATE ACCEPTANCE. The Commonwealth of Pennsylvania supports the Preferred Alternative without comment.

COMMUNITY ACCEPTANCE. Community acceptance of the Preferred Alternative will be evaluated after the public comment period ends and will be described in the Record of Decision for Operable Unit Two.

SUMMARY OF PREFERRED ALTERNATIVE - OPERABLE UNIT TWO

Under EPA's Preferred Alternative for Operable Unit Two, a mobile incinerator and a mobile *fixation* unit would be brought to the site. The upper vault wastes, hazardous miscellaneous products/feedstocks, and hazardous combustible site structures would be incinerated in the mobile incinerator. The incinerator ash and the lower vault wastes would be fixated with cement. The *lagoon* wastes would be fixated with iron. The hazardous permeable site structures would be coated and sealed. The hazardous impermeable site structures would be steam- or water-washed. The treated wastes, the untreated (nonhazardous) miscellaneous products/feedstocks, and the untreated (nonhazardous) site structures that are not salvaged would be landfilled off site. The estimated cost of this proposed remedy is $45,800,000.

NEXT STEPS

EPA relies on public input so that the remedy selected for each Superfund site meets the needs and concerns of the local community. To assure that the community's concerns are being addressed, a public comment period will be held concerning the Proposed Plan. During this time, the public is encouraged to submit comments on the Proposed Plan and RI/FS to EPA. EPA, in consultation with the Commonwealth of Pennsylvania, may modify the preferred alternative, select another response action presented in this Plan, or develop another alternative, if public response warrants such an action, or if new material is presented. Therefore, the public is encouraged to review and comment on all the alternatives identified here. The remedy selected will be documented in a Record of Decision (ROD) that summarizes EPA's decision-making process.

Background documents regarding the Whitmoyer Laboratories Site, as well as copies of the Remedial Investigation and Feasibility Study reports and this Proposed Plan, are available to the public at the information repository listed below:

Myerstown Public Library
199 North College Street
Myerstown, Pennsylvania

PUBLIC COMMENT INVITED

EPA will hold a public meeting at 7:30 p.m., Tuesday, April 24, 1990, at the Jackson Township Building on Ramona Road in Jackson Township to discuss the remedial alternatives and the proposed remedy for the Whitmoyer Laboratories Site. Interested citizens also will be provided with an opportunity to ask questions and provide comments.

The public meeting will take place during a minimum 30-day public comment period on the Proposed Plan. The public comment period begins on April 13, 1990, and concludes on May 14, 1990. Citizens are encouraged to review site-related documents and submit written comments to one of the following people:

Albert W. Peterson, APR (3PA00)
Public Affairs Specialist
U.S. EPA - Region III
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-4081

Anthony T. Dappolone (3HW23)
Remedial Project Manager
U.S. EPA - Region III
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-3153

All comments must be submitted to one of the above people and postmarked on or before May 14, 1990.

GLOSSARY

Applicable or Relevant and Appropriate Requirements (ARARs) -- The Federal and state requirements that a selected remedy will attain. These requirements may vary among sites and alternatives.

Aniline: A colorless organic liquid with a chemical formula of $C_6H_5NH_2$.

Arsenic: A toxic metal, which can be volatilized at high temperatures. Arsenic can exist as a solid or gas under normal temperatures.

Cap: A covering, usually composed of layers of specially selected soils and an impermeable synthetic material that work together to prevent water from flowing into a contaminated area in the ground. This minimizes the incidence of contaminants being carried off site through ground water or *surface water.*

Carcinogen: Cancer-causing substance.

CERCLA: Comprehensive Environmental Response, Compensation and Liability Act of 1980. Also commonly referred to as Superfund.

Cubic Yards (C.Y.): A measure of volume.

Encapsulation: Enclosure of a material in a protective skin or coating.

Fixation: A process that reduces the hazard potential of a waste by converting the contaminants into less soluble or mobile forms.

Groundwater: The water beneath the earth's surface that flows through the soil and rock openings and often serves as a principal source of drinking water.

Incineration: Burning; ignition; reduction to ashes.

Lagoon: A shallow artificial pool or pond area.

Landfill Closure: Closure option for a RCRA unit in which the contaminated material is left in the unit, requiring a *cap* and post-closure plan.

mg/kg: Milligram per kilogram, a concentration corresponding to a part per million (ppm).

Leachate: A contaminated liquid resulting from precipitation flowing through waste materials and collecting components of these wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or groundwater.

Microencapsulation: Chemical or mechanical process in which solids are encased with a binder (such as asphalt) in the form of microscopic capsules.

National Priorities List (NPL): EPA's list of top priority hazardous wastes sites that are eligible to receive Federal funds for investigation and cleanup under the Superfund Program.

Organic Compounds: Chemical compounds composed primarily of carbon and hydrogen, including materials such as oils, pesticides, and solvents.

RCRA: The Resource Conservation and Recovery Act, EPA's comprehensive regulations for the management of hazardous waste.

Remedial Investigation/Feasibility Study (RI/FS): Two distinct but related studies conducted at the same time, which together are referred to as the RI/FS. They are intended to gather the data necessary to determine the type and extent of contamination at a Superfund site; establish criteria for cleaning up the site; identify and screen cleanup alternatives for remedial action; and analyze in detail the technology and costs of the alternatives.

Residual Waste: Nonhazardous wastes from industrial, agricultural, or mining operations.

Sediments: Materials that settle to the bottom of a creek, lake, stream, or other body of water.

Surface Water: Bodies of water on the earth's surface that are exposed to the air. These bodies include streams, rivers, lakes, and oceans.

Vitrification: A process in which electricity is passed through electrodes placed into the wastes, heating and melting the wastes, and forming an inert, glass-like product.

GLOSSARY OF EVALUATION CRITERIA

OVERALL PROTECTION OF HUMAN HEALTH AND ENVIRONMENT addresses whether or not a remedy provides adequate protection describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

COMPLIANCE WITH ARARS addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

LONG-TERM EFFECTIVENESS AND PERMANENCE refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME through treatment is the anticipated performance at the treatment technologies that may be employed in a remedy.

SHORT-TERM EFFECTIVENESS refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period.

IMPLEMENTABILITY is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the chosen solution.

COST included capital and operation and maintenance costs.

STATE ACCEPTANCE indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the preferred alternative.

COMMUNITY ACCEPTANCE will be assessed in the Record of Decision following a review of the public comments received the RI and FS reports and the Proposed Plan.